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Ingwersen, Peter; Larsen, Birger; Kelly, Diane; Wang, Peiling; Lykke, Marianne

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Panel: Perspectives on Adaptivity in Information Retrieval Interaction (PAIRI)

Peter Ingwersen (moderator); **Birger Larsen**
Royal School of Library and Information Science, Copenhagen, Denmark
{pi, blar}@iva.dk

Diane Kelly
University of North Carolina at Chapel Hill, NC, United States
dianek@email.unc.edu

Peiling Wang
University of Tennessee Knoxville, TN, USA
peilingw@utk.edu

Marianne Lykke
Aalborg University, Denmark
mln@iva.dk

ABSTRACT
Adaptivity in IR interactions requires the IR systems adapting to users' situations and the users adapting to the systems. System adaption entails dynamic user modeling, effective information architecture and enhanced search features such as search integration and relevance feedback; user adaptation through interactions entails mental model building and modification towards a coherent state of knowledge and learning.

The panel is structured as follows. Initially we provide an overview of the panel contents, consisting of four central dimensions of adaptivity in IR interaction. These are adaption 1) through integration of information objects; 2) of information system to searcher; 3) of searcher to information system; and 4) to context and practice. The sequence follows the order of the panellists, i.e., each panellist is the prime mover of a particular dimension.

Keywords
Human-Computer interaction, information architecture, digital libraries, information retrieval interaction.

INTRODUCTION
One of the major challenges facing information retrieval (IR) interactions is adaptivity. Adaptivity in IR interactions requires the IR systems adapting to users' situations and the users adapting to the systems. System adaption entails dynamic user modeling, effective information architecture and enhanced search features such as search integration and relevance feedback; user adaptation through interactions entails mental model building and modification, knowledge change such as from an anomalous state of knowledge (ASK) towards a coherent state of knowledge (CSK), and learning.

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Each panellist will do a Pecha-Kucha presentation (20x20: 20 slides and 20 seconds per slide) to make the panel communication with the audience as interactive and dynamic as possible. Each presentation will be followed by a lively audience-panel interaction on the dimension. Since the four dimensions overlap to a degree the individual panellists may indeed contribute to the other dimensions as well.

CONTENTS
According to the interactive IR conceptions by Saracevic (1996) and Ingwersen & Järvelin (2005), the IR system should be tailored to support the searcher by providing means to better fit the system to the searcher's situation, context and task at hand. Accordingly, information adaption takes place along four different dimensions of IR interaction. It is the intention of the panel to address the issues of information adaption in these four dimensions:

1. *Adaption through integration* of information objects. Prime mover: Birger Larsen
2. *Adaption of the IR system* to the current searcher. Primer mover: Diane Kelly
3. *Adaption of the searcher(s)* to the IR system. Prime mover: Peiling Wang
4. *Adaption to context and practice* through tailoring of information architecture. Prime mover: Marianne Lykke

THE FOUR DIMENSIONS

The First Dimension

The first dimension addresses the reality that not all information objects are created equal and differences in genre, document and media type, and knowledge domain have significant effects on retrieval and search behavior. Traditionally, genres, media, and domains have had their own specialized, separate search tools. However, emerging digital libraries and institutional repositories hold collections that mix the variety of information objects and search tools. In parallel the wide availability of information on the Internet drives massive efforts by academia and industry for one-size-fits all search solutions, which is epitomized by the current web search engines and the attempt to a universal search model. Practices have established a *de facto* standard for information interaction where all users start their searching for any kind of information using the same simplistic interface regardless of their information needs and searching experiences.

However, increasingly the diversity of information objects creates problems for digital libraries and repositories because a lack of research-based knowledge of how users adapt to the new systems from traditional systems. User's adaptation to new search situations by integration of relevant pieces of different kinds of information during retrieval and presentation of documents is hampered due to insufficient knowledge of the pertinent issues. This phenomenon calls in particular for investigations of realistic search behavior in situations of information requirements addressing more than one media, genre and document type simultaneously.

The Second Dimension

The second dimension looks into the interaction process itself from the system's point of view. It attempts to address issues of how to design adaptation to supporting tasks and tracking current task stage as well as search and domain expertise of current user through individual interaction processes and/or including social utility features, such as log data. Relevance feedback and subsequent query modification techniques combined with elements of user modeling have for decades been seen as central tools in individual adaption and personalization. Historically we have moved from explicit relevance feedback applying terms and/or documents as triggers for feedback to the IR system into the use of implicit features of the interaction process itself. Implicit applications of relevance feedback require more elaborate user models. A pertinent issue of systems' adaption to searchers is how much context user models must capture in order to function adequately.

With the growth of social applications on the Web, there is also a growth in people's willingness to engage in online interactions and provide feedback about all sorts of things. Thus, it seems like this is a good time to revisit explicit term relevance feedback techniques, including both traditional term and query suggestion features, and to suggest novel hybrids of kinds of relevance feedback. All major search engines have these types of features, but their form and function has changed little overtime.

The Third Dimension

The third dimension stresses the opposite and broader perspectives of the users *adapting to IR systems*, or information and communication technologies (ICT) at any given moment during human-computer interactions (HCI) and information seeking. User-centered research has made limited progress in understanding and supporting users' adaptation behaviors. Often users are interacting with several different information systems (including IR) simultaneously. As technologies advance rapidly in the 21st century, information environment is also changing rapidly. Information systems are increasingly complex and interwoven in contents and functions yet deceivingly easy with improved interfaces. However, users are frequently frustrated as they hit brick walls at points of interactions. Regardless of competency levels, users must learn constantly through interactions with the systems. Current systems have very limited learnability that can accommodate different levels of ICT competency. *Learnability* is an important aspect of adaption in IR interaction. A central question is raised: What and how do human users learn during HCI? Learning during interactions is a human adaptive behavior that can measure a system's learnability. Learnability is not merely a system's usability attribute (ISO/IEC 9126); learnability is the reciprocal experiences of an ICT system and its users affected by the system's affordability (clues, cues, and context-sensitive help) and users' cognitive states (knowledge, IT competence, and information habits).

The Fourth Dimension

The fourth dimension concerns the adaption to context and practice through tailoring of information architecture. *Tailoring* is designing information architecture (IA) to the *use* context in the work place, i.e., to the context, its users and content (Morvelle & Rosenfeld, 2007) and several projects have been successfully implemented. The focus of tailoring is on adaptivity of IA for IR in the work-place environment where professional users share, search, and use information to solve work tasks. The Morville & Rosenfeld's (2007) definition and framework of IA is used as a basis because this model has been specifically designed for Web-based systems such as Websites and intranets. The adaption analysis is concentrated on three IA components:

the organisation system, the label system, and the navigation system. The organisation system is composed of organization schemes, which define and group Website content items, and organisation structures that define the types of relationships between content items and groups. The label system is the set of expressions that represent and name groups or chunks of content in the Website. The navigation system is composed of several basic elements including the global, local and contextual navigation systems integrated within the Webpages themselves and infused with the content of the site.

PANEL FORM

The panel is intended as a technical panel applying the vivid Pecha-Kucha form of presentation by panellists and followed by interactions with the audience. The allotted length of 90 minutes will be structured as follows. Initially, the moderator introduces the panel, panellists, the format of the session, and the major theme and perspectives in Pecha-Kucha form (20 slides displayed for 20 seconds: 400 sec or 6 min and 40 sec). Then each panellist as a prime mover presents 20 slides. For each panellist we suggest that the last slide contains a pertinent question concerned with her/his theme as a stimulus to the audience to be discussed (and secondarily by the panellists). We would allow a maximum of 10 minutes for discussion following each panellist (7+10 min x 4 = 68 min + introduction (7 min) = 75 min.). This should provide amble time for question/answers to make the panel more interactive and spontaneous before closing up. During the session, audience may also write questions on cards and the moderator will collect and incorporate them into panel discussion. Questions from the audience that a later panellist is going to address (known by the moderator) will be taken up at the relevant occasion. The last 5 minutes are used for closing up the panel discussions by the moderator. The moderator prepares a range of central questions known to the panellists, to stimulate interactions in case of a stand-still moment of audience/panel discussions. We believe that the proposed form assures audience-audience and audience-panellist interactions. Some of the panellists have tried the Pecha-Kucha-like penal form previously, without the last question-slide, though. Therefore, it seems better to apply the question modus in order to stimulate dynamic and vivid interactions with the audience.

SHORT BIOGRAPHIES AND BRIEF STATEMENTS OF PANELLISTS

Peter Ingwersen

Full Professor, Royal School of Library and Information Science, Denmark. Ph.D. in 1991 from Copenhagen Business School. Visiting scholar at the European Space Agency, Italy, 1980-84. Affiliate Professor at Rutgers University, USA, 1987 and the Dept. of Information Studies, Tampere University, Finland, 1999-2002 and Åbo Akademi University from 1998. Honorary Doctor of Philosophy, Tampere University, 2010.

Research areas: Interactive IR; Evaluation methods for work task-based IR; Informetrics, Scientometrics & Webometrics.

He has published several well-known research monographs, and more than 90 journal articles and conference papers, in addition to editing work. Among his academic awards are: the ASIS&T Distinguished Research Award (2003), the Best Teacher Award of Information Science (2007) and the Los Angeles ASIST Chapter's CISTA Award for continued contributions to Information Science (2009). In 2005 he received the distinguished Derek de Solla Price Medal for his informetric and webometric research by the International Society of Scientometrics and Informetrics. He is member of the editorial boards of five internationally leading journals in IR and Bibliometrics and organized the ACM_SIGIR (1992), CoLIS 2 (1996) and IIiX (2006) conferences and served as PC Chair at the ISSI, CoLIS, ACM-SIGIR Conferences on several occasions.

Panel experience

Moderator and panellist at IIiX symposia 2006 and 2008; ECIR Conferences and ESSIR summer school, 2001 and 2009; several minor (inter)national meetings.

BIRGER LARSEN

Associate Professor, Royal School of Library and Information Science, Copenhagen, Denmark since 2006. Ph.D. 2004. From April 2010 he is head of the research group on Information Systems and Interaction Design. His main research interests include Information Retrieval (IR), structured documents in IR, XML IR and user interaction, exploitation of context in IR, and the combination of citation networks and bibliometric methods for improved IR. From 2004 to 2007 he co-organized the Interactive Track at the Initiative for the Evaluation of XML Retrieval (INEX). He has published in central journals, such as IPM, JASIST, Research Evaluation and Scientometrics and contributed to the INEX, ECIR, ECDL, CIKM and IIiX conferences.

Panel experiences

Panellist at INEX workshop 2008 on interactive and metric issues.

Pertinent questions to address

Given that a range of different information genres and media types are in play at the same time in the same system – how can we design systems that flexibly adapt to and allow interactions with different information types without confusing and disorientating users? How can each type of information have an equal (or at least fair) chance of being retrieved – even with shallow data?

Diane Kelly

Associate Professor at the School of Information and Library Science at the University of North Carolina, Chapel Hill. She received a Ph.D. in information science and a

graduate certificate in cognitive science from Rutgers University. Her undergraduate degree in psychology is from the University of Alabama. Her research interests are in interactive information search and retrieval, information search behavior and evaluation methods and metrics. Her research has been published in several conferences and journals including ACM SIGIR, ACM CHI, CIKM, IIiX, JCDL, Transactions on Information Systems, Information Processing and Management, IEEE Computer and CACM. She teaches courses on research design, interactive information retrieval and foundations of information science. She is the recipient of two teaching awards: the 2009 ASIST/Thomson Reuters Outstanding Information Science Teacher Award and the 2007 SILS Outstanding Teacher of the Year Award.

She has served on the UNC Behavioral Institutional Review Board (IRB) since 2005.

Panel experience

Panellist at the ACM SIGIR Workshop on the Future of Evaluation (2009); IIiX Conference Panel on Information Interaction: Problems and Challenges (2008); and the ACM SIGIR Workshop on Web Information Seeking and Interaction (2007).

Pertinent questions to address

How can we create hybrid techniques that incorporate both implicit and explicit relevance feedback? What techniques might be used to track the searcher's progression through a task? How can we subsequently use this knowledge to tailor the techniques we use to elicit feedback from searchers to these aspects?

Peiling Wang

Full Professor, University of Tennessee, Knoxville, USA. Her research areas include information seeking and user behaviors, data mining and knowledge discovery, research methodologies and methods, knowledge structures, and citation analysis. She is a PI of several research projects (including OCLC/ALISE Research Grant and an IMLS Research Grant). She has authored or co-authored more than 60 publications. She served the editorial board of LISR, 2003-2008 and reviews for journals and conferences. She is an active member of ASIST and has served and chaired ASIST Awards Juries. Her honors include the 1994 ASIST Doctoral Forum Award; the 1999 Best JASIST Paper Award; the 2005 Thomson ISI Outstanding Information Science Teacher. She is a frequent speaker and panellist at national and international conferences, such as ASIST.

Panel experience

Organizer/moderator of ASIST Annual Meeting Panel on Advancing Relevance Research (2003); panellist at ASIST Annual Meetings: Panel on Usage Data (2003), Panel on Mental Models of IR system (2004), and Panel on Internet Transaction Log Studies, (2005). Panellist at ALISE Conference Panel on Future Research Agendas (2001)

Pertinent questions to address

How do users adopt new functionalities of the systems? How can users' adaptive behaviors help system design? What kind of adaptation support do users need at different stages of information seeking?

Marianne Lykke

Professor at the University of Aalborg, Denmark. She was Associate Professor at the Royal School of Library and Information Science, Aalborg, Denmark since 2001 and holds positions as Professor II at Oslo University College and Affiliate Professor (docent) at Åbo Akademi University. Her main research interests include methodologies for design of information architecture (IA) and knowledge organization systems (KOS) in digital libraries and web-based retrieval systems, including studies of user interaction and persuasive design strategies. She is co-chairing two NSF funded research projects Pathway and FIRE, improving information retrieval in domain-specific digital libraries. She consults for several Danish companies and organizations concerning design and evaluation of IA and KOS, and is in the editorial board for New Review of Hypermedia and Multimedia, Knowledge Organization, and Dansk Biblioteksforskning. She has co-organized the NKOS workshops (Networked Knowledge Organization Systems and Services) since 2004. She is Danish member of the international ISO standard commission revising international standards for thesauri and other knowledge organization systems.

Her more than 50 publications include journal articles, conference and workshop papers and book chapters, published both internationally, like in J. of Documentation, Information Systems, or ASIS&T, ECIR, CIKM, ISKO, JCLC and nationally, and often co-authored with collaborators from a widespread network of researchers. She is broadly engaged in program committees and reviewing in major journals and conferences within the areas covered by her research interests.

Panel experience

Panellist at ASIS&T Panel "Conceptions of task as a methodological issue: Scandinavias on Information Seeking and Retrieval research (2004)

Pertinent questions to address

Which models of information science are feasible to adaption via tailoring? – What kind of tools should be developed to carry the research ideas over into workable solutions in practical terms?

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Saracevic, T. (1996). Relevance reconsidered '96. In: Ingwersen, P. & Pors, N.O. (Eds.) Information Science: Integration in Perspective: Proceedings of the 2nd International Conference on Conceptions of Library and Information Science (CoLIS 2), October 13-16, 1996, Copenhagen, Denmark, p. 201-218. Copenhagen, Denmark: Royal School of Librarianship.

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